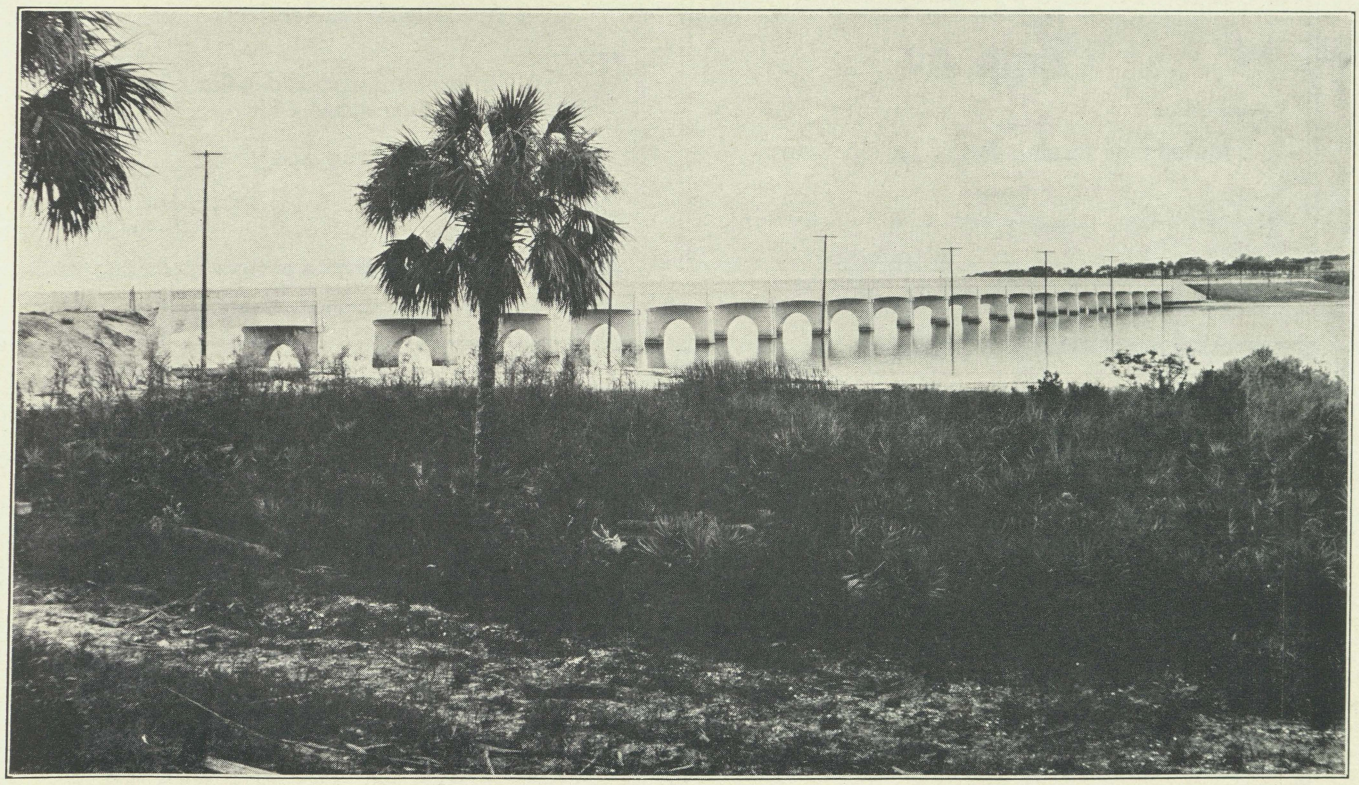
FLORIDA HIGHWAYS



F. A. Project 39-A. Road 4. Sebastian River Bridge.

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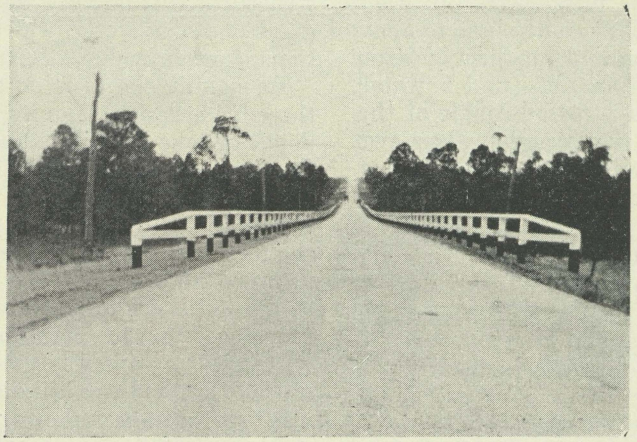


Vol. IV MARCH, 1927 No. 3

Bridge Construction in Florida

By R. L. BANNERMAN

Division Engineer, First Division, State Road Department.

(An address delivered at the Road Conference held at the University of Florida, Gainesville, Feb. 16th.)

Bridge construction in Florida is a little different from that in other states, on account of the variable foundation conditions. In Florida 75 percent of the money spent on bridges, is hidden below the ground surface, and likewise more than 75 percent of the trouble encountered, is below the surface or with the foundations. I believe that the cost of building bridges in Florida has amounted to at least 25 percent more than it should have, on account of designs being made without knowing the true character of the supporting material. This runs into millions of dollars.

Up to a very short time ago, the State Road Department did not make very thoro investigations before designing bridges. We were young and did not have the necessary equipment for making adequate borings. The result was that the supporting material was found to be different, in many cases, from that shown on the plans, which necessitated lowering the footings or redesigning the same. This not only was very expensive but the work was materially delayed. As a rule the people do not care very much about the cost, but delays are dangerous. A good example of this is the Choctawhatchee River Bridge, which cost thousands of dollars more than the original estimate and its completion was delayed more than a year on account of inadequate surveys.

We now have several good boring machines and before a bridge is designed, borings are made under the position of each pier and abutment, so as to determine just what is there. The result is that on the later bridges, the cost conforms very closely with the original estimate and most delays have been eliminated. In many cases it has been possible to raise the elevation of a footing above that shown on the plans. This was the case with the Ocklocknee River Bridge, which is just completed. The total cost runs approximately $3,000.00 under the contract price, and the contractor exceeded his time limit only ten days, which was very good on account of the fact that the work was delayed several days on account of high water during the storm of last September.

The foundations are the most important in bridge construction, and for discussion, I shall divide the supporting material into three classes, the first of which consists of sand, clay or any material that cannot be classified as rock. These usually call for foundation piles and are the simplest to handle. If the cofferdam is sufficiently tight to enable the water to be kept down, the excavation should be made in the dry, the piles driven and cut off and the footing poured in the dry. If the flow of water from the bottom is too great for unwatering, the excavation should be made under water, using a clam shell bucket, after

which the foundation piles are driven. A seal is then poured and allowed to cure the required time, after which the dam is unwatered and the footing completed in the dry. In this case, the excavation should be made deeper than required to allow for a possible rising, caused from compaction by the piles. Also the question of cutting off the piles comes up, when the latter method is used. It is usually best to allow them to extend up thru the seal and cut them off after unwatering, thus eliminating cut-offs under water. The Escambia River Bridge is a good example of this type and altho this is one of the largest bridges ever built by the Department it was one of the simplest. Practically no troubles were encountered with the foundations.

In the second class, the supporting material consists of soft lime rock. These are usually easy to handle and provide excellent results. By using steel sheet piles for the cofferdam and driving so as to provide a good toe-hold in the rock, it is usually possible to do all work in the dry. The cofferdam should be made a little larger than the dimensions of the footing, so that in case water causes trouble, a form may be placed inside of the sheet piling, to permit the seepage water to be carried between the form and the piling to a sump in one corner, where a pump is operated. In case water does not cause trouble, it is usually cheaper to leave out the form and pour the full size of the hole. The Ocklocknee River Bridge is a good example of this type.

In the third class, the supporting material consists of hard, flinty lime rock, usually porous and honeycombed. These are by far the most difficult to handle. In the first place, it is very hard to secure good borings, on account of the fact that the hole may hit a solid portion of the rock or boulders, in which case the true conditions are not represented. It is very difficult to secure a tight dam and in many cases cannot be unwatered on account of blow-ins from the bottom. Steel sheet piles should always be used for this type of work. The excavation should be made by one of the methods previously described and if the dam can be unwatered, the footing should be poured in the dry, if not a seal should be poured as described. In this class of foundations, it is usually possible to drive foundation piles in portions of the area, in which case it should always be done. They do not cost much and they insure good results. The Choctawhatchee River Bridge is a good example of this type.

Many engineers are opposed to pouring concrete under water. It should not be done unless necessary. However, good results may be secured by using every precaution. A bottom-dump bucket is preferred to a treamie and the concrete should be fairly wet to insure proper spreading, when the bucket is lifted.

After adequate soundings have been taken and the bridges properly designed, often trouble is encountered during construction. If possible these should be handled by a field man, who is competent and authorized to decide on the proper solution. Competition between contractors is keen and the successful bidder, as a rule, does not have too much profit in a job. It requires very little delay on account of foundation trouble to eat up his profit. Therefore, when trouble is encountered which necessitates a change in the footing or abutment, a qualified man should go into the trouble in detail, on the ground, decide on the proper solution, incorporate the same in writing, and allow the work to proceed.

We are now making surveys and preparing plans for the two big bridges near Panama City on Road No. 10. One will cross West Bay and will be approximately 6200 feet in length, the other will cross East Bay and will be approximately 3500 feet long. These structures will be very interesting on account of the great depth of water, which exceeds 50 feet over portions of each bridge.

In making the location and taking the borings for these bridges, it was quite a problem to get the water depth or take a boring at any desired point. We first used buoys, anchored 100 feet apart. These were placed by driving a launch along the centerline, which towed a skiff by a steel tape. When the rear end of the tape came opposite the last buoy another one was dropped at the front end of the tape. This method would not check accurately with the triangulated distance, and was too erroneous for use. Finally, a No. 12 telephone wire was used, anchored on one side to a dead-man and to a windlass on the other side, which was used to tighten the wire. Fifty foot stations were marked on the wire, using small pieces of oil cloth, securely attached to the wire. The station numbers were written on oil cloth tags in indelible ink. Each station was corrected for the sag of the wire, with the result that the total distance agreed within two feet of the triangulated distance, which was sufficiently accurate for the purpose. This wire served to hold the alignment, as well as to furnish the station numbers.

AUTO GAS TAX BRINGS $85,000,000 IN SIX MONTHS

Taxes on gasoline used in motor vehicles amounted to $84,939,373 in the first six months of 1926, according to the Bureau of Public Roads of the United States Department of Agriculture. This amount was made available as follows: $54,981,677 to State highway departments, $19,338,976 for county and local roads, $6,329,413 for State and county road bonds, and $4,140,998 for miscellaneous purposes.

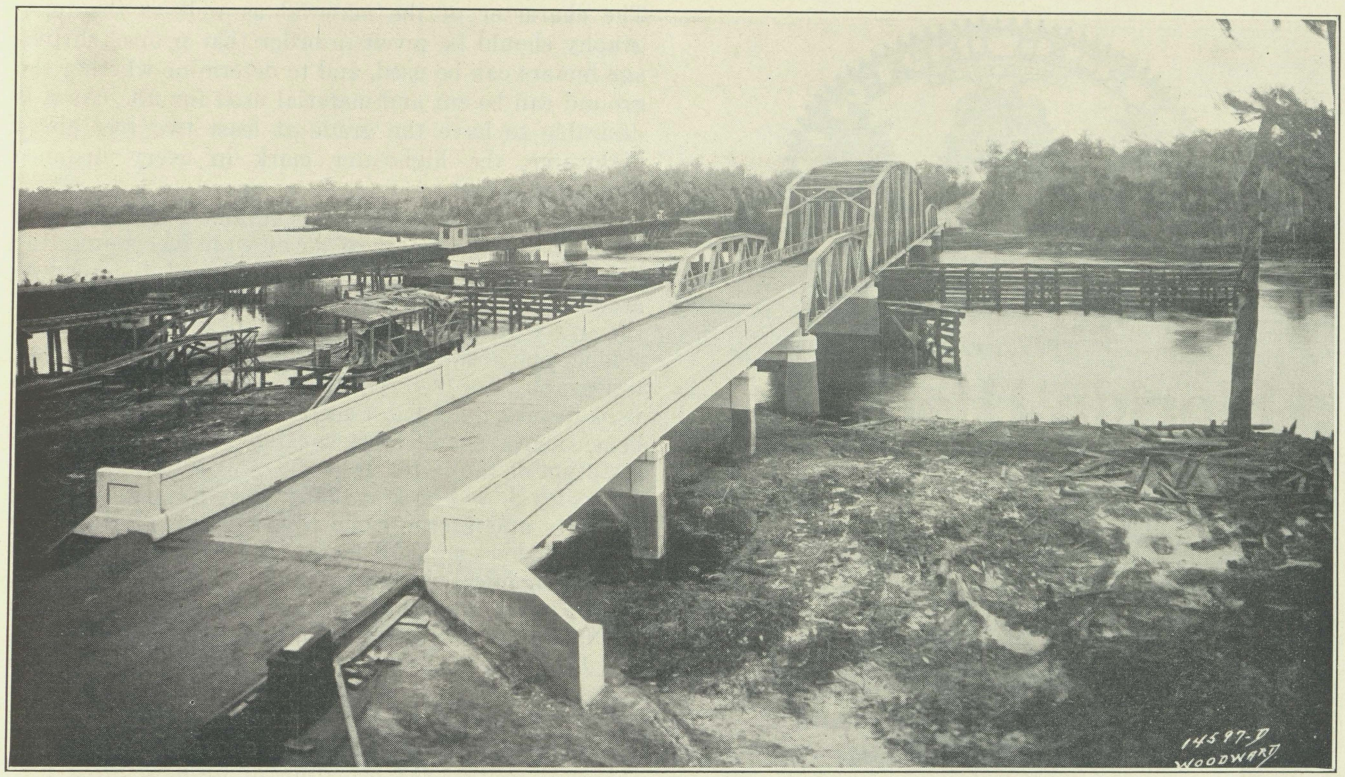
A total of 3,560,987,586 gallons of gasoline were taxed and it is estimated that an additional 856,450,000 gallons were consumed in the four States in which taxes are not collected. All of the States except Illinois, Massachusetts, New Jersey and New York imposed a gasoline tax, the rate ranging from one to five cents with an average of 2.39 cents per gallon. Since 19,697,832 motor vehicles were registered in the six months period, the gasoline consumption per vehicle averaged 225 gallons.

Gasoline taxes were first imposed in 1919 when four States adopted the tax and derived a revenue of a little more than one million dollars. The practice is now general and the large revenue derived is one of the most important sources of highway income.

The revenue from the gasoline tax in the first six months of 1926 by States was as follows:

Alabama	$1,175,152
Arizona	456,334
Arkansas	1,861,280
California	7,413,624
Colorado	921,426

(Turn to page Five)



Project 421. St. Mary's River Bridge. Road 3.

Correlation of Field and Office Practice

By F. W. BERRY, Jr.,
Office Engineer, State Road Department.

(An address delivered at the Road Conference held at the University of Florida, Gainesville, Feb. 16, 1927)

I am afraid that what I have to say this morning will to those assembled here seem most elementary, yet it is the little things which give the most trouble in Engineering work as well as in other lines of endeavor.

The whole object in making surveys and preparing plans for road construction is in order that the Engineer handling the construction in the field and the contractor or other agency who does the construction work will have some definite task before them to perform. Also to incorporate Standard Practice and Design.

The preparation of a complete working set of plans depends entirely on the accuracy with which the location is made, and the adequacy of the Survey Notes. It is impossible to prepare an accurate set of plans in the office or anywhere else, unless the survey notes are complete and correct.

The Engineer making the location survey should be thoroughly familiar with what Standards are in use and the information desired. He must possess a certain amount of common horse sense and be intelligent to a certain degree. In most cases those in the office who prepare the plans have never been over the location and have no idea of the character of the territory through which the road is to run. It therefore follows that the field notes must supply perfectly this information if the plans are to be correct in any sense. This is the most flagrant cause for criticism of the field engineer, the lack of information in his notes and his failure to realize that the office man is not as familiar with the location as he is.

It is hardly necessary for me to mention that the traverse should be correct in regard to curve function, equation, etc., and must be thoroughly referenced, yet it will surprise you to know how many errors are made in calculating curve functions and how often equations are misstated and omitted entirely, nor do the equation in the alignment book check with equation in the level books. The level line should check and equations in level lines always given.

If cross sections are taken with hand levels care should be exercised that the readings are indicated by + and — signs. Should the method of taking cross sections be changed to a wye level the H. I. should be given. It is far preferable to use the same method on one survey and not mix them up.

The line should in every case tie into section lines. This is especially valuable to the office in furnishing description for right-of-way. A traverse should be run of all Drainage Areas in order to determine the area that is to be drained, so that a structure of adequate size can be designed. (Property map and drainage map should be prepared by the Field Engineer.)

It is very necessary that the flow line of all drainage ways be obtained, as this will determine the elevation of the grade, by placing same so as to obtain sufficient headroom for the required structure. If a structure will not drain without constructing a lateral ditch, then a profile and cross section should be taken of the proposed lateral ditch and as well as a traverse.

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The character of the material as well as the topography should be given in order that proper shrinkage factors can be used, and to determine whether the ground can be cut and material used for fill. As it is desirable to have the grade at least two feet above highwater, the highwater mark in every instance should be given.

When all the information is obtained from the field it then becomes the task of the office to incorporate the information in the plans, and to design the road in accordance with standard practice and in order that the cost will be the minimum.

The plans should correctly show the alignment, topography and references in order that they can be used to pick up the line in the field. The profile and bench marks should be accurately shown and the description of the latter given.

Grades should be laid that will give the best riding qualities and at the same time eliminate all danger (such as short sight distance on vertical curves) and be as economical as possible to obtain the two features.

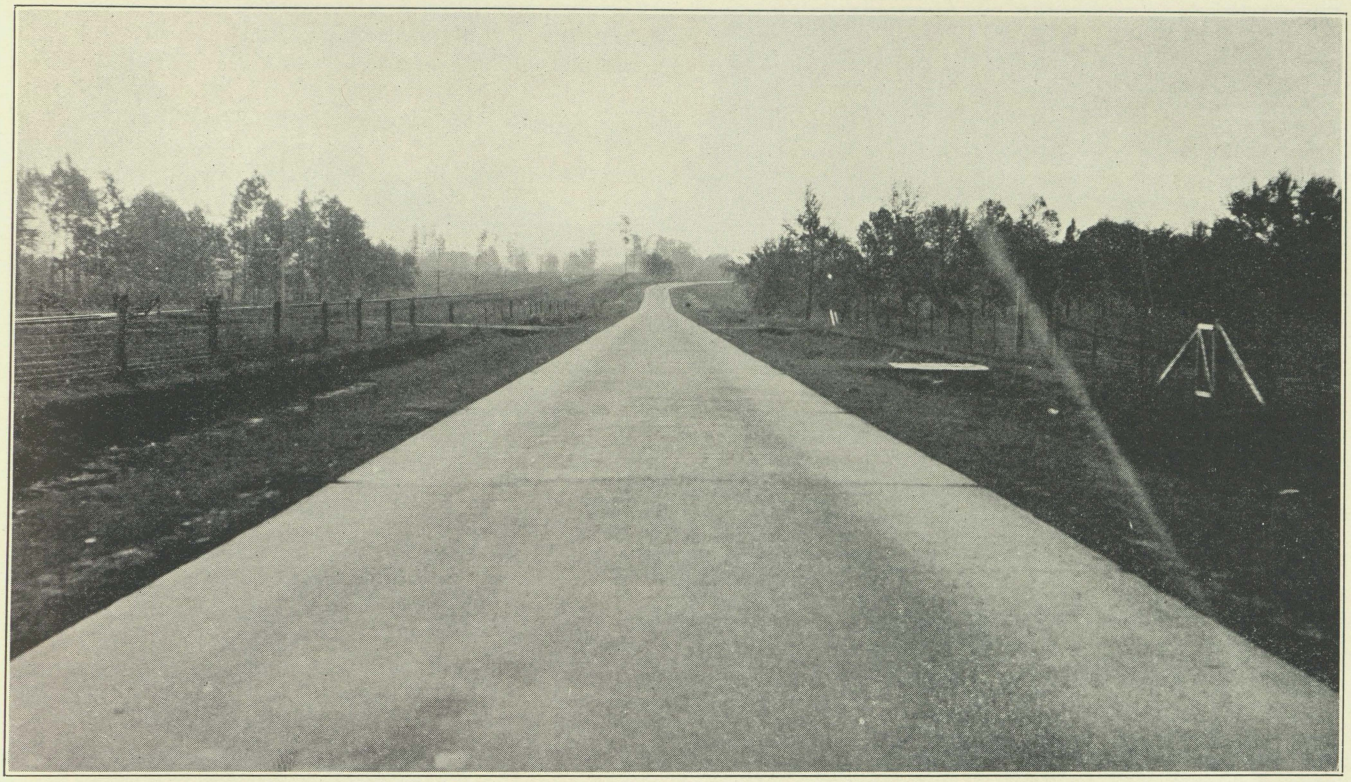
In Florida special consideration has to be given to drainage and the drainage structures largely control the design of the grades. Water has to be carried to the drainage outlets in side ditches, and the grades laid to do so, then as before mentioned it is desirable that grades be at least two feet above highwater and this will control the elevation of grades across fills, as also the amount of cut necessary to make fills.

Care should be exercised in determining the size and length of all structures, particularly culverts. Often the lengths given are too short, and if so the cost will be increased in so much as steel has been ordered for the size specified.

The amount and manner of superelevation on curves should be carefully worked out and shown in order to provide comfortable riding. The superelevation will affect the grading quantities. All of which can best be determined in the office. It is often desirable to draw a contour map of curves that are to be superelevated in order that there will be no doubt just how much superelevation is to be given and to control the drainage properly. This contour map is especially desirable where there are street intersections, as grades, superelevations, drainage conditions and alignment can then be accurately shown.

There are in use several methods of laying grades, such as the mass diagram, fitting templates to each section in order that cut and fill in each section will balance and thus obtain a series of elevations through which an average grade can be laid. This method will produce a very irregular grade, the mass diagram is liable to be costly. It is preferable to lay a grade suited to the drainage situation, and balance same by judgment, then figure the cross section and adjust grade if necessary to balance; this adjusting often can be obtained by lengthening vertical curves. Balances can not always be obtained within the free haul and wherever the balance points exceed the free haul limit, a mass diagram should be prepared in order to determine the overhaul quantity.

Care should be exercised in summarizing the quantities to make sure nothing has been omitted. Wherever quantities are omitted it means large force account bills, which will cause the final cost to greatly exceed the estimate. This often happens through no fault of the office, and it invariably is due to the lack of information from the field. There cannot be an appre-



Concrete Pavement. Road 7. Escambia County.

ciable over-run in paving quantities, nor in culvert and bridge quantities unless from the introduction of additional structures over those called for on the plans and faulty information as to foundations. Most over-runs are therefore in the grading quantities and are caused by drainage ditches that are found necessary during construction because the drainage was not thoroughly investigated during the survey. Improper shrinkage factors produce the bulk of grading over-runs, and are likewise due to the failure of the locating engineer to make the necessary soundings to determine the character of the materials in the locations.

AUTO GAS TAX

(Continued from page Two)

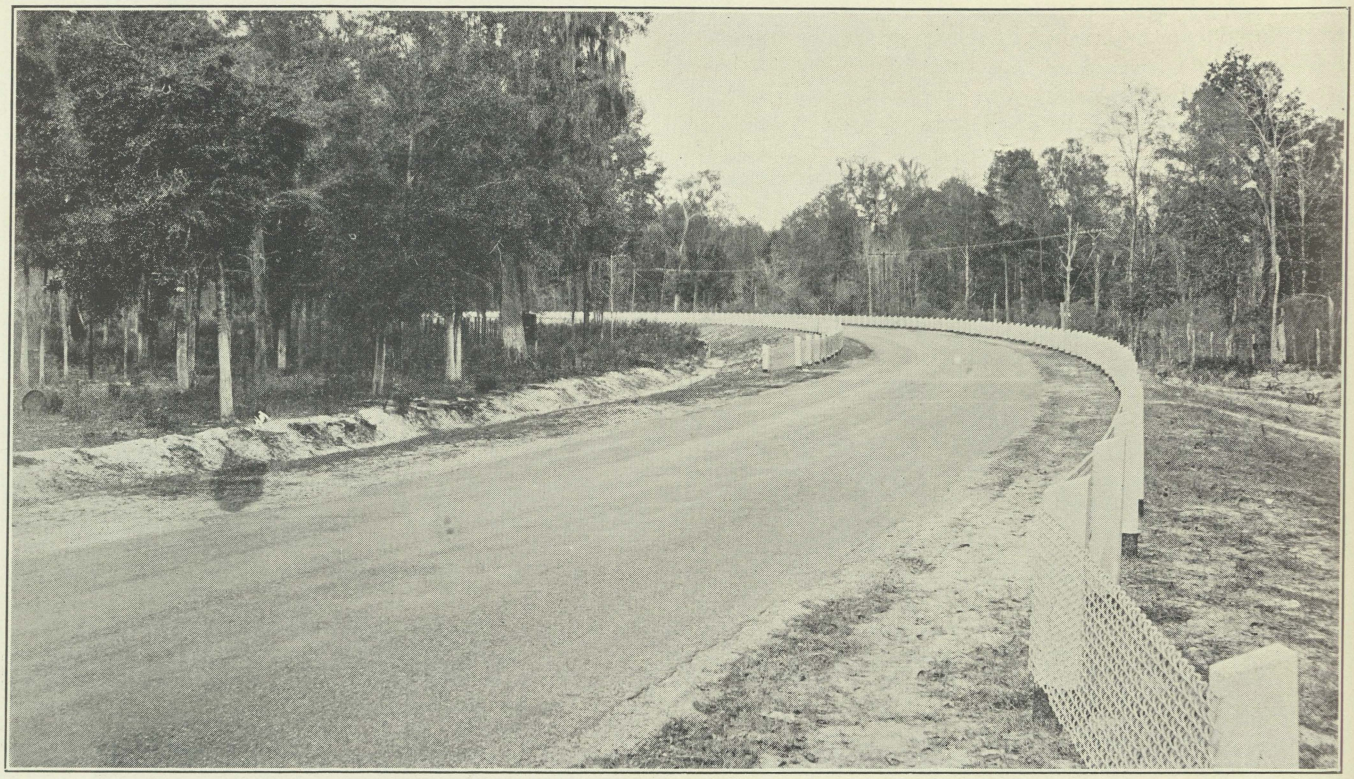
Connecticut	1,140,433
Delaware	173,214
Florida	6,197,421
Georgia	2,559,217
Idaho	477,123
Illinois	
Indiana	4,022,264
Iowa	2,193,634
Kansas	1,839,712
Kentucky	2,448,809
Louisiana	1,253,859
Maine	561,791
Maryland	1,019,388
Massachusetts	
Michigan	4,373,598
Minnesota	2,148,340
Mississippi	1,722,707
Missouri	2,561,611
Montana	388,946
Nebraska	1,402,941
Nevada	173,719
New Hampshire	263,944
New Jersey	
New Mexico	332,536
New York	
North Carolina	3,598,412
North Dakota	339,507
Ohio	5,968,232
Oklahoma	2,775,015
Oregon	1,466,204
Pennsylvania	5,252,410
Rhode Island	224,693
South Carolina	2,454,033
South Dakota	848,663
Tennessee	1,700,601
Texas	2,355,792
Utah	568,724
Vermont	179,468
Virginia	2,446,643
Washington	1,595,302
West Virginia	1,194,022
Wisconsin	2,189,579
Wyoming	220,833
District of Columbia	478,217
Total	$84,939,373

Extravagance

Ike: "Look, pap, Abe's cold is gone, and ve still got left a box of cough drops."

Father: "Oh, vat extravagance; tell Herman to go and get his feet wet."

Extraction of road taxes from the populace has been found less painful by the use of "gas" than by any method tried.—Kentucky Highways.



Project 505. Road 2. Columbia County. Rock base, Surface Treated.

A Billion Dollars in Tolls Yearly Provide Modern Highways*

Judson C. Welliver Interviews Thos. H. MacDonald, Chief, U. S. Bureau of Public Roads.

THE motor tourist en route from coast to coast stops his car at a filling station on the side of a cement road in a middle western state, and to the attendant's polite "How much?" replies:

"Ten gallons."

While the "gas" is being drawn the attendant, noting that the car bears a California license, ventures:

"You've come a long way, sir?"

"Yes, considerably more than 2,000 miles," replies the driver. "And these last few miles have been particularly interesting, because I used to live in this county, and this is my first visit for a dozen years. When I last saw it there were only dirt roads; mud in rainy weather, dust in dry. In the last hour we have almost crossed the county, on either cement or macadam. When I lived here, it would have taken half a day, and pretty nearly ruined a car."

By this time, the tank being filled, the motorist interrupts his reminiscenses to inquire:

"How much?"

"Ten gallons at 21 cents; $2.10," advises the attendant.

Mr. Motorist passes over a bill, and while change is being made, continues:

The Highway Revolution

"We've come from California, and have scarcely had enough bad roads to make us appreciate the good ones. Yet it's only a few years since we all used to talk and write endlessly about the country's greatest single need being good roads. They used to tell us it would take centuries to equip this country with such roads, because of the expense. But here they are; I wonder how the country managed to pay for them."

"Well, sir," suggests the gas man, "you have just paid an installment on them yourself. You paid 21 cents a gallon, of which 3 cents is state tax going straight to the road fund. Last year that 3-cent tax in this state aggregated almost $7,000,000. Every dollar of it went into these roads. Besides that, the state collected nearly $5,000,000 from motor licenses. That went to the road fund, too. So you see you folks who buy the gas are the ones who build the road."

"But, of course," suggests Mr. Motorist, "there's the big contribution that the Federal Government makes to aid in state road construction. At least, that part of it doesn't precisely come out of the man who pays the gas bill."

The attendant, who happens to be of the sort that specializes in understanding his job, smiles broadly.

The Story of Federal Aid

"That's where you are mistaken. Last year the Government paid about $96,000,000 to the states to help their road building. But in the same year Uncle Sam collected over $143,000,000 in internal revenue taxes on motor cars, parts and accessories. So you see the man who buys the gas not only paid the National Government's share, but enough more to leave Uncle Sam a balance of nearly $50,000,000."

Mr. Motorist's interest was a good deal intrigued, and a few days later, being in Washington, he drove

*From The National Sand and Gravel Bulletin.

around to the Department of Agriculture, and called on Thomas H. MacDonald, Chief of the Bureau of Public Roads. He wanted to know whether the filling station man had his facts on straight.

Mr. MacDonald was gracious, and more. Quite evidently he wanted people to know about the very matters Mr. Motorist was finding so interesting.

"The people of the United States are now spending just about an even billion dollars annually in building good roads," he said. "That doesn't include city streets; just country roads. A little more than half of this is spent under the states' departments of roads, and a little less than half under the minor governmental units—counties, townships, etc.

"To put it another way, the country is spending on rural highways alone just about as much as the National Government cost before the war. It is one of those astonishing things that, a dozen years ago, nobody would have believed possible; and yet it is not only being done, but being done so easily that few people fully realize its significance. Why, it has taken nearly a century to get $20,000,000,000 invested in our national railroad system; the rural highways system, at the present rate, will require that much in less than twenty years.

"But," interjected Mr. Motorist, "how about this statement that the special taxes on motor vehicles and their fuel amount to about half the billion dollars spent for highways each year?"

"It is excessive only in its moderation," replied Mr. MacDonald. "Nobody can give you exact figures. But here are some items. Put them down on a paper, there. The state taxes on gasoline, ranging from 1 cent up to 5 cents per gallon, in 1925 were just about $143,000,000. Put that down. Next, set down $263,500,000, as the 1925 fees for automobile registration and licenses. Then another $150,000,000 as estimated property taxes on 20,000,000 automobiles in this country. After that, set down $143,430,709, the Federal excise tax on automobiles, parts and accessories for 1925. Finally, put down $50,000,000 as probably a conservative estimate of the wheelage taxes, additional tax on gasoline charged by cities or counties, and fines collected from motorists. Now add those figures."

Mr. Motorist "totaled up" the items and announced that they aggregated $749,930,709.

"According to this," he said, looking up, "the motorists are paying very near the whole of the national road bill, instead of half."

"Yes," replied Mr. MacDonald, "and we have not included all the items. Thus far, I have given you figures that for the greater part are either official or approximately so. But they do not include property taxes of the automobile manufacturers, nor taxes on buildings and lots devoted to motor car merchandising. They do not include income and corporation taxes derived from motor car business. They omit all state, local, production, corporation or income taxes of the petroleum industry. Yet that industry has a capitalization of about $9,000,000.000."

Mr. Motorist made a little calculation on his paper. Looking up, he said:

"These additional taxes would run at least $345,000,000, on the basis of taxes in general. If we add that in, it totals $1,094,930,709. That's what car owners and builders, gasoline users and producers, are paying. It more than meets your whole highway cost of a billion."

Mr. MacDonald leaned back and thought a moment.

"There is a widespread notion," he presently said, "that Federal Aid represents a large share of the investment in good roads. As a matter of fact, in the eight years from 1918 to 1925 inclusive, the Government has contributed $460,000,000 to help the states build roads. That is considerably less than half of what the country spent on roads in either 1924 or 1925. Moreover, in the same eight years that the Government was distributing that $460,000,000 to the states, it collected $873,000,000 in internal revenue taxes on motor cars, parts and accessories. Other hundreds of millions were collected in income and corporation taxes from motor car manufacturers and dealers. The Federal contribution to roads, as compared to that of the people who make and use the cars and gasoline, has been decidedly a modest one.

"On the other hand, while the Federal contribution is only about 10 per cent of highway expenses, it has accomplished results altogether out of proportion to its amount. First, it was an incentive to the states, because Uncle Sam required them to invest at least as much as he contributed. Also, the Government retains a part in the general supervision of construction, and a share in determining routes. So we have built roads on higher standards, and have organized them into a truly national system, instead of forty-eight state systems.

"Some day it will be realized that this was the most valuable contribution. A man driving from Boston to New York may pass through four states. Every one of them might have a splendid highway system; but if these did not articulate at the state lines, the trip would be almost impossible.

"The Federal Highway Act of 1921 required that a complete, nation-reaching system of roads be designated within two years as the ones to which Uncle Sam would give assistance. Nobody who was not connected with this department will ever have the faintest conception of the task involved in laying out that map. It was found that there were 2,866,061 miles of highway in the country. Of these, 7 per cent, or 200,624 miles, were to be included in the national system, eligible for Federal aid. Well, pretty nearly every mile of the 2,866,061 was a candidate for designation as a Federal highway. Nobody will ever dream how much pulling and hauling, log rolling, and variegated influence was enlisted. But in the end the system as laid out was a truly national one.

"When the map was published it showed nearly the entire 200,000 miles of designated roads; and since then 46,485 miles of these have been improved; nearly 13,000 miles more are under construction, and over 2,000 miles approved for early beginning of work. In addition to that, many states have built, without Federal aid, extensive sections which are included within this national system; in fact, these state contributions aggregate 65,000 miles; so that approximately two-thirds of the 200,000-mile national highway system has been initially improved.

"Along with all this, there is the Federal supervision over construction and maintenance. When Uncle Sam has helped build a road, he reserves authority to require its proper maintenance. Then there is the business of uniform marking along highways, which makes it possible for motorists to drive thousands of miles on a designated route whose markings become so familiar that after a few miles he need not ask questions.

"Finally, Federal participation has made possible

a great number of important bridges at strategic points. When a stream separates two counties or two states, it has often been impossible to get them to agree where to build and how to divide the cost of a bridge. In such cases the Federal authority has repeatedly mediated differences and secured construction. Let me mention some instances.

"Missouri has been a state for over a century. Divided east and west by the Missouri River, communication between the two sections has been limited, to the state's disadvantage. Four bridges across the Missouri were required in the national highway program; and Federal co-operation with the state has made it possible to secure them.

The Tennessee-Arkansas Case

"An even more striking case is at Memphis, Tenn., where for generations there has been need for better crossings of the Mississippi. It was largely a question of expense. But under the present-day plan for financing highways, that difficulty is almost removed. Last year Tennessee collected $3,193,453 in gasoline taxes, while Arkansas collected $3,668,995. Then the two states collected nearly as much more in motor vehicle fees. With the Federal Government paying somewhere near half, and the states having this $12,000,000 fund to draw upon, one readily sees how the financial problem is solved.

"Another bridge that has a peculiar importance, both locally and in the national highway system, has likewise been needed for generations, across Raritan Bay, New Jersey. It is one of the links in the chain of communication between New York City and the country. In 1924 New Jersey had some $700,000 of Federal aid allotted to her, and in 1925 over $1,000,000. So the state agreed that this Raritan bridge should be built, costing about $4,000,000. Federal funds made up about one-third the amount. The bridge, over a mile and a half long, is now nearly completed."

Fast Growth of "Gas" Tax

Mr. Motorist was by this time so far interested that when he reached New York he called on the American Petroleum Institute and the National Automobile Chamber of Commerce. From them he learned that the gasoline tax was first imposed in 1919, in the State of Oregon, and has now been adopted by all states, except Illinois, New York, New Jersey and Massachusetts. The tendency has been continually to increase the rate per gallon. As late as 1921 gasoline taxes for the entire country were only about $5,000,000; a year later, $12,000,000; in 1923, almost $37,000,000; in 1924, $79,000,000, and in 1925 nearly $143,000,000.

With good prospects that the "gas" tax will be adopted in the near future by states which do not now have it, and with the gallonage rates being increased in other states, Mr. Motorist calculated that this tax alone would soon total $200,000,000 a year; quite possibly, during 1926.

On his way back to California, Mr. Motorist stopped at the same filling station where his interest in highway finance had first been aroused. He found the same attendant and ordered the same ten gallons. While he was paying, he said:

"I find that the total of motor vehicle licenses, automobile property taxes, gasoline taxes, internal revenue taxes on cars and parts, various special motor taxes, and, finally, the general property taxes, corporation and income taxes, of the oil industry and motor car manufacturers actually amount to nearly a hundred million dollars per annum in excess of the billion dollars that the country is spending to build and maintain roads."

"Which suggests," replied the station attendant, "that without quite realizing it we have returned to the old system of collecting tolls for the use of the highway."

"That seems to be precisely the situation," replied Mr. Motorist as he "stepped on it" and headed his car westward. "We folks who buy number plates once a year and 'gas' all the time, are building the good roads of the nation."

INTERNATIONAL ROAD CONGRESS FAVORS INVITATION TO MEET IN U. S. 1929

The International Road Congress will accept an invitation to meet in the United States in 1929, according to Senator Albert Mathieu, of France, president of the association. This assurance was given at the close of the congress held at Milan, Italy, September 6 to 14, and in response to the statement by Thomas H. MacDonald, Chief of the United States Bureau of Public Roads and chairman of the official delegation from the United States, that the United States Congress would be urged to extend such an invitation.

The congress at Milan was attended by 2,000 delegates from 50 countries and five continents, and the United States was officially represented for the first time. Mr. MacDonald was made a member of the council of the congress.

In the discussions of the congress, the United States and Great Britain declined to adhere to a resolution commending as a general policy the private operation of government subsidized toll roads, which has been tried out successfully on some stretches of Italian road. The United States delegates advanced the argument that roads are a government function and should be open to the use of all except in rare cases where private construction should eventually result in public operation. A resolution providing for all viewpoints was adopted.

Following the meeting in Milan the United States delegates went to Rome, where they were received in a private audience by Premier Mussolini, who asked them to convey a message to the United States that they had seen a disciplined and tenacious people courageously at work and desiring only peace. In response to Mr. MacDonald's statement that in modern highway transportation there is a new way of living ahead for the masses, the premier stated his conviction that motor roads must be built everywhere as railroads and carriage roads have been built in the past.

The American delegation left Rome for a survey of traffic and road conditions in Western Europe and sailed from Southampton on October 12.—Michigan Roads and Pavements.

Superior First Aid

Nell: "If a man tried to flirt with you, would you call a policeman?"

Bell: "No, a minister."—Florida Times-Union.

Project 597. Road 4. Volusia County South of Oak Hill.

Modern Highway Traffic and the Planning of State Highway Systems

By DR. J. G. McKAY, Chief, Division of Highway Economics, U. S. Bureau of Public Roads.

THE last 15 years have seen the re-emergence of highway transportation, one of the oldest methods for the movement of people and goods, from the position of comparative unimportance to which it had fallen during the period of greatest railroad development to a position of the first rank in the national scheme of transportation. Mass movement of people and commodities on the principal routes of the various state highway systems confronts us as a fact and not a theory.

The general field of motor-vehicle transportation can be divided into three major classes of service. First is the local distribution of commodities and local transportation of people. This service constitutes in tonnage the bulk of the motor-truck movement and is primarily the distribution of goods within cities and their suburban areas. In Connecticut 67.1 per cent; in Ohio 64.2 per cent; and in Pennsylvania 77.3 per cent of the net tonnage transported by motor truck is hauled less than 30 miles. Seventy per cent of the net tonnage hauled in Cook County by motor truck is a direct distribution of commodities to points of final use. In passenger transportation the principal function is also mass transportation within local areas.

The second principal class of motor-vehicle service supplements existing rail and water service by extension of freight and passenger service into areas not served by rail or water lines; substitutes motor-vehicle operation of unprofitable branch lines; and provides a combined service in conjunction with railroads or boat lines or both. The primary function of the motor vehicle in this joint movement is the movement of people or goods in the short haul.

Long Haul Transportation

The third class of motor-vehicle service is the so-called long-haul transportation. This type of service is not important as to quantity of movement nor would it appear to be economically sound. For motor trucks, at least, the volume of tonnage in the long-haul zone is comparatively small and decreasing in importance. In Connecticut, 15.2 per cent; in Pennsylvania, 6.9 per cent; and in Ohio 15.9 per cent of the net tonnage is hauled over 60 miles. Usually long-haul transportation is limited to movements in which speed of delivery or some special characteristic is the principal determining factor.

A relatively small percentage of motor trucks are engaged in the commercial transportation of freight. On the Maine highways 8.7 per cent; on the Pennsylvania highways 13.6 per cent; and on the Ohio highways 21 per cent of the loaded trucks are commercial, operating either for hire or on contract.

Analysis of motor truck transportation in the several States shows that the development of a large system of motor trucking over a considerable area beyond the short-haul is economically unsound. The movement out of cities is primarily a local process

Road 8. Highlands County. Lime Rock Base, Surface Treatment.

of distribution. The movement toward cities consists largely of goods produced in the area, principally food products. The volume of goods moving between two shipping points is unbalanced in the short-haul and progressively unequal with increase in distance. This fact negatives the development of long-haul motor truck transportation as a system of haulage.

The cost of providing motor-truck common-carrier service increases with increase in distance, owing primarily to the increasing terminal cost ratio to total net revenue, return movement of empty trucks, and partial loads at full rates or full loads at low rates.

Development of Short Haul

The principal function of the motor vehicle as part of a correlated system of rail, water, and highway transportation, as indicated by present trends, seems to be its development in the short-haul zone with great potential possibilities of volume service in terminal areas of dense population.

The functional relationship of the motor vehicle and water transportation would appear to be the transfer of goods to and from docks and the mechanical organization of motor truck loading and unloading methods in the water shipping area to facilitate rapid loading and unloading of cargoes.

The principal service of the motor truck as a part of organized rail transportation is primarily in the rail freight transfer areas and in the short-haul movement of rail package freight. Whatever we may think of present motor vehicle operating methods, if there is a real demand for this type of service it will continue to develop. The problem lies in the intelligent organization, improvement and control of this type of transportation. Probably the next few years will see the organization of large motor vehicle operating companies functioning as a part of existing rail and water systems or as independent operating companies. Since the haulage of goods and people can be generally safeguarded by regulatory legislation, it would seem that present rail or water lines should qualify as the responsible financial and experienced agencies of mass transportation of people and goods in this rapidly developing field of motor vehicle transportation.

Meanwhile, no matter under whose guidance the organization of motor vehicle operation is developed, there remains the present problem of intelligently planning highway systems to serve this rapidly growing method of transportation.

Planning Improvement

There is no fundamental difference in principle between the public business of developing systems of highways, and private enterprises engaged in producing commodities or in the performance of services. For example, light and power, gas and telephone utilities and other industries are all engaged in the production of their commodities for public use. The history of their modern development and expansion is largely a development based upon a careful analysis of the demand for their product by present and potential consumers in a given area. The soundness of their analysis of the need for new service and the expansion of their plant anticipating the demand for their product has been an influential factor in the progress or lack of progress of many communities.

The same basic economic and engineering principles of management that exert such a controlling influence in the field of private business should govern the public business of production in the highway field.

Applied to the public business of a State responsible for developing a connected system of improved highways to facilitate the transportation of people and commodities, the first basic principle of produc-

tion management is that the various sections of a highway system selected for improvement and the type of improvement chosen for each section should be based upon present and expected future traffic demands, modified by the various physical and economic characteristics which affect the choice of specific construction types to be built on the various sections of a State highway system.

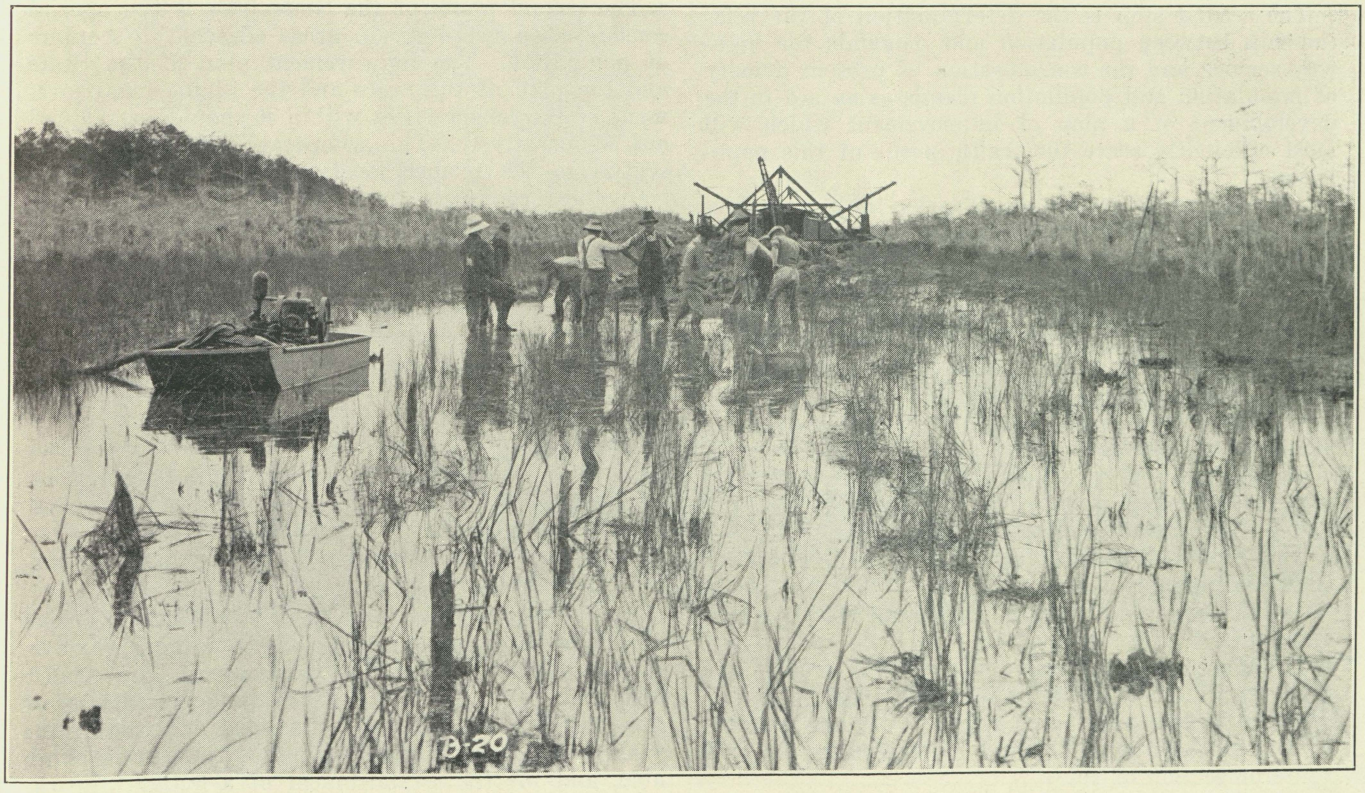
The second principle is the familiar one of the budget upon which all financially sound industries operate. Applied to the highway business it involves: (1) the determination of the amount of money required to complete the improvement; (2) the apportionment of the cost among those who benefit from the improvement of the highways, and provision through necessary legislation for raising the required highway funds. This management must insure the expenditure of the money in accordance with a predetermined plan of improvement in which each route or section of a route is to be improved to the degree required by the traffic and to no greater or less degree. The raising of revenue is the responsibility of the State Legislature, and is always the final limiting factor in any program of public works. Provision by a Legislature of more than the necessary revenue is apt to encourage waste; provision of sufficient funds, well managed by the highway department, results in a well-balanced system of highway improvements and the economic development of the State as a whole; provision of insufficient improvement funds defers the true improvement of a highway system, forces the highway department to spread uneconomically its expenditures of State funds over the entire State system, usually results in the development of a highway system below the requirements of traffic, and, if continued over a period of years, increases the total ultimate cost of highway transportation.

The establishment of scientific plans for highway development, which will result in the maximum of highway improvement and highway transportation service, with available revenue, labor, equipment, and building materials, requires a careful analysis of highway traffic, the trend of its development and its distribution over the highway system. The necessity of such an analysis is now recognized by highway executives, but their efforts have been handicapped by lack of precise knowledge of the character and amount of present and expected future traffic using the various sections of the system.

The plan of State highway improvement may materially alter the economic and social development of a people as a whole or any section thereof. The location and improvement or lack of improvement of a given route is of vital importance not only to the traffic of the immediate locality, but also to the traffic of larger areas. Therefore, the development of a system of highways should not be judged as miles and types of highways constructed each year but considered in terms of the movement of people and goods. The planning and construction of a connected system of highways deal in fact with the destiny of localities and States, their agriculture, their industries, the growth of suburban areas adjacent to centers of population, and the social activities of a people. This is a tremendous social responsibility and not merely a problem of physics concerning mixtures of cement, water, brick, steel, bitumens, stone aggregate, gravel, equipment, and labor into what we now term the modern road.

The Major Problem

The major problem is not one of the particular type of materials to use, but rather whether to build or not, and how much highway service should be



Project 669-V. Road 27 (Tamiami Trail). Loading Crew in Action.

furnished a given area. Upon the proper solution of these problems depend the well-being and progress of a people. Considering the improvement of highways from this point of view there can be no question concerning the necessity of developing sound plans for highway improvement over a period of years in the several States, and of providing the necessary money to carry out economically the proposed plan of improvement.

The principal classes of highway improvements are: (1) New construction, (2) stage construction, (3) reconstruction, (4) building of bridges and culverts, (5) highway and railroad grade separations, (6) widening of present highways, and (7) methods of guiding and safeguarding traffic.

Each of these classes of improvement, although more or less distinct as a class, is part of a general scheme of betterment, and especially within congested population and traffic areas the highway engineer faces the urgent need of solving all these complicated problems of highway improvement. The development of the plan as a whole, including each of the several classes of improvement, should be based largely upon present and expected future traffic and "lay-out" and condition of the existing highway system in any given area.

The first step in planning a program of highway improvement is the measurement of the present, and the prediction of the future volume and character of traffic on the State primary, secondary and tertiary systems. The principal traffic factors involved in judging the relative traffic importance of the three systems, or sections of each system, are the average daily and maximum total traffic, and the average daily and maximum truck traffic using each section. The average daily number of loaded (one-half to 2½-ton), medium (3 to 4-ton) and heavy 5 to 7½-ton) vehicles is an important factor in the determination of the plan of improvement as well as in the selection of the types to be constructed.

The second step is the determination of the relationship between population and demands for highway service and the consideration of present density of population and population trends as an aid in the development of a plan of improvement which will most efficiently serve the traffic needs of this population.

The next step is the classification of the various highways or sections of highways as major traffic routes (Class A), secondary traffic routes (Class B), and minor traffic routes (Class C). A class A highway is defined as one that requires one of the so-called rigid types of improvement, concrete, brick, bituminous concrete, or their equivalent. A class B highway is defined as one that requires a so-called flexible type of improvement, such as standard bituminous penetration macadam or its equivalent. A class C highway is defined as one that requires other lesser types of improvement.

Principal Factors Involved

The principal traffic factors involved in such a classification are:

(a) Average daily and maximum total traffic and truck traffic.

(b) Forecast of average daily total traffic and truck traffic for periods of 5 and 10 years.

(c) Average daily and expected future number of loaded light, medium, and heavy trucks for each route or section of route.

(d) The ratio of the total number loaded trucks to the total traffic in order to separate for special consideration routes or sections of routes on which motor trucks are an abnormally large or small proportion of total traffic.

(e) The number and frequency of critical heavy loads.

(f) Average maximum traffic as one of the width of the improvement of additional parallel routes and the "by-passing" of congested centers of local traffic.

(g) Analysis of highway maintenance, and capital costs and vehicle operating costs as an important factor in determining the traffic limits for the various types of improvement.

The fourth step is the measurement of motor-vehicle mileage on the primary, secondary, and tertiary highway systems, and the estimate of the earning capacity of these three systems to determine the relative vehicle use value of each as a guide in developing the plan of improvement and the budgeting of construction and maintenance funds.

Finally, we must have a thorough analysis of the present system and the physical condition of the existing improvements on it, since the plan of betterment must, in general, incorporate the existing State highway system as the basis of the improvement plan.

Special Consideration Necessary

A State plan of highway improvement can be separated into two distinct planning phases.

The first is the general State plan, consisting of a connected system of primary, secondary, and tertiary routes serving each section of the State. It should be recognized that just as there is a considerable variation in the present and expected future volume of traffic on the highway system of the different States, so there is within each State also considerable variation in the present and expected future traffic on the various sections of the primary and secondary system.

The second phase of the State plan is the special consideration necessary in areas adjacent to centers of population. The improvement plan of the State and the plan of the State and the plan of improvement of the larger cities within it should be worked out co-operatively. This co-operative planning is essential to the proper location and entry of State routes into congested traffic areas, to avoid dumping traffic from one or more than one State route into an already congested area, to provide for adequate connections and improvement of the city streets that join State routes at city limits, to make provision for "by-passing" congested traffic areas, to eliminate obstructions to the easy movement of traffic, and finally to provide belt, arterial, and secondary local traffic routes to facilitate the rapid, safe, and unobstructed flow of traffic in congested traffic areas.

In the final analysis the worth of a transportation survey and the resulting plan of highway improvement is measured by the actual highway construction, reconstruction and widening program which is carried into effect over a period of years.

The State highway engineer, as the executive director of the public business of providing highways, is responsible (1) for the analysis of the traffic demand for his product on the various sections of the State system; (2) for a financial analysis of the yearly cost, the revenues required, the funds available, and for the establishment of a budget for the period of the improvement program; and (3) for the

business and engineering management of the improvement program.

The major limiting factor is the financial program set up by the legislative organization responsible for raising revenue to give reality to any plan of highway improvement; and, therefore, a large part of the responsibility for the character and condition of a State system of highway rests upon the department of State government responsible for the raising of highway funds and not upon the department charged with the duty of constructing the highways.

BRAIN VS. BRAWN IN THE BUILDING OF HIGHWAYS

How many remember the days when about once a year the farmers turned out with their oxen and shovels and piled a conglomeration of sods and dirt up in the middle of the road and called it road building? The balance of the year they wallowed through it either dirt or mud. The job was done by main strength less brains. The same thing is being done today. Gobs of gravel are being piled in the middle of the roads and left for the traffic to wallow through indefinitely. In some instances roads are being repaired by the use of brains, and in these cases these gravel piles are lacking. The dressing is added in thin layers, the low spots are filled up and the road is at all times in usable condition. There is no reason why streets cannot be repaired intelligently and substantially, and this fact is being demonstrated out on the trunk lines and county roads where the old-time sod piles and the heap of gravel in the middle of the roads is lacking.—Exchange.

Although women are now wearing only about one-fifth of the clothes they wore ten years ago, hooks in closets are just as scarce for husbands.—Louisville Times.

Had Pershing Worried

During a lull in the Great World War, General Pershing made his first visit to the front line trenches. He was guided by a young captain late from training school.

Upon arriving at the reserve divisions, the young captain in a low whisper explained, "These are the reserve divisions on rest, sir."

"Yes?" replied Pershing in the same low whisper.

Moving slowly they came to the second line trench. Here the young captain again in a low whisper said, "This is the second line trench filled with soldiers ready to relieve those in the front line trench, sir."

"Yes?" whispered Pershing.

Arriving at the lookout post the young captain in a very low whisper explained, "This is the observation post—it is the furthest point of advance, sir."

"Yes," whispered Pershing, "how far are we from the Germans?"

"About a mile, sir," whispered the young captain.

"THEN WHAT IN HELL ARE YOU WHISPERING FOR?" roared the general.

"I have a bad cold, sir," whispered the young captain.—Monogram Topics.

Little Martyr.

"Now, Robert," said his Sunday-school teacher, "what do you understand by suffering for righteousness' sake?"

"Please, miss," answered Bobby, "it means havin' to come to Sunday-school."—Boston Transcript.

Father: "There was something funny about you last night, daughter."

Offspring: "I know, but I sent him home as early as I could."—Boston Beanpot.

Plain Cement Concrete Construction. Project 565. Road 1.

Europe to Beat U. S. Record in Road Building

Laid Out Systems 150 Years Ago Which Will Be the Basis for Resurfacing. Money Problem Can Be Met By Increased Wealth from Motor Transport. Thos. H. McDonald, U. S. Highway Chief, Delegate to the Milan Congress, Says Berlin Has Model City Plan.

Thousands of miles of highways will have to be reconditioned throughout Continental Europe in the near future to care for the growing needs of motor transportation in the judgment of members of the United States delegation to the Fifth International Road Congress who have returned from an intensive survey of road and traffic conditions abroad.

The outstanding impression of the delegates gained from a 4,500 mile trip through eleven countries was that the history of motor development in this country is about to find a parallel in Europe. As a corollary to this, they anticipate a large highway building program with the sharp difference from practice here that many of the countries of Europe already have carefully laid out systems which go back as far as 150 years ago. In these cases, they said, resurfacing and widening is all that will be needed to bring the roads to the best modern standards.

Motor Transport Creates Wealth

"Official Europe is pessimistic regarding the outlays which are requisite for this task," says T. H. MacDonald, Chairman of the American delegation and chief of the United States Bureau of Public Roads, in a report compiled by the secretary of the Delegation, "but the cold statistics show that the people are buying motor cars in an increasing amount every year. As the number of motorists grows, the pressure for better roads is becoming general and there is no question but that ways will be found to meet the demand.

"Fortunately the problem is not so serious as it first sounds because, as experience has amply demonstrated in the United States, sound road development adds enormously to the wealth of the country. Not only are real estate valuations and transport costs in Europe already beginning to reflect the effect of road-building, but the Continental countries have another major asset in the army of motor tourists who are only awaiting the improvement of roads to send their battalions into all parts of Europe."

High Cost of "Mud Taxes"

The chief distinction which has existed between motor transport in Europe and here, in Mr. MacDonald's judgment, is in the point of view which has been adopted toward the vehicle itself.

"In America," he said, "the motor car is recognized as an essential utility. In Europe it has been considered a luxury. However, if we go back only a few years in our own history, it is not difficult to recall that we started from the same premise. Sheer economics forced us to modify that position and to build miles upon miles of highway in order to avoid paying mud taxes which were far in excess of the cost of the roads. The day is immediately at hand when Europe will have to take the same attitude."

Appian Way Obsolete

During their journey through Europe, the delegation had an opportunity to study many of the historic roads of Europe at first hand, as well as to observe the complicated modern traffic problems which confront the great capitals.

"Perhaps one of the most interesting days of our journey was that spent in a study of the Appian way," said Mr. MacDonald, "As a conception of a traveling way for the armies of old Rome, this highway, crossing in a straight line from the old city to the Adriatic sea, was a magnificent idea. As a modern highway, however, it is simply a monument.

"Most of us think of it as a traveled road. The fact is that whatever remains of the old structure is retained as a memorial and not used for traffic. The new Appian way has superseded it and it is this fact which has given rise to the generally held belief that the road of 2,000 years ago is still in traffic use.

Napoleon a Highway Expert

"The roads of Napoleon and Maria Theresa and their contemporaries, however, are another story. As report has it, when the great Frenchman laid out his military highways he did it with ruler and pencil and then ordered his armies to build accordingly.

"Further he built for strength and the result is that today throughout France and Central Europe there are thousands of miles of main highway of a much greater depth than any which our finances have yet permitted us to build in the States, which are still in use.

"In the years of the Great War and since, these roads have been suffered to fall into a state of disrepair which makes most of them scarcely passable. Everywhere, however, there is evidence of repair work under way, notably in France and Germany, where the reconditioning is now well along.

"Financially, probably Austria and Hungary have the most difficult problem to meet, but even there some work is being done and more will be.

Denmark Has Best System Today

"Of all of the countries which we had the opportunity to observe, Denmark appeared to have the most adequate system of highways at the present time, largely owing to the fact, no doubt, that the nation was not a participant in the war. Some of the roads of the little kingdom by the sea are very old and one of them, built some 200 years ago, became a public highway only after the king tired of hanging subjects who persisted in using it.

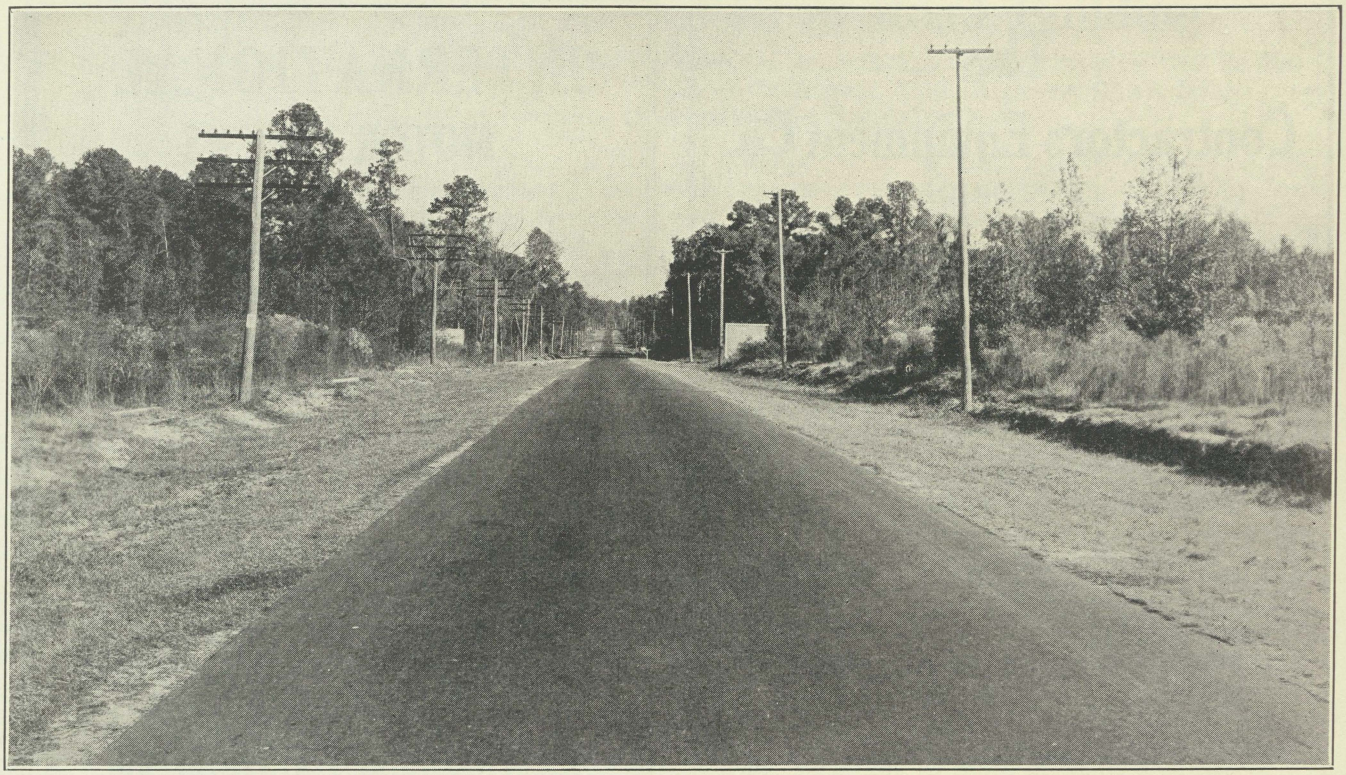
"We were particularly impressed by the way in which Swedish authorities are attacking their problem. The Scandinavian country has thousands of miles of roads which will require major and very costly treatment in the form of widening and straightening. As this is done a new and most interesting country for touring will unquestionably attract thousands from all parts of the world."

Asked about conditions in England, Mr. MacDonald said that the thoroughgoing way in which the British are meeting the needs of a very heavy and diverse traffic was striking to all of the delegation.

"Ancient Rights" Blockade in England

"As every traveler knows," was his comment, "England has many most attractive country roads which wind their way through some of the most de-

(Turn to page 16.)



Project 545. Road 5. Hernando County. Sheet Asphalt.

EUROPE TO BEAT U. S. IN ROAD BUILDING

(Continued from page 14.)

lightful garden spots to be found anywhere. The Englishman is conservative and the 'ancient rights' which the engineer meets on every side as he tries to ameliorate severe traffic conditions constitute a problem quite unknown elsewhere. For example, the fact that certain hay markets have had their lodgment in one of the busiest streets in old London for centuries, gives them rights which make for intense congestion and yet the engineer must take time and patience before he can overcome this condition.

"Part of the task of modernizing London's roads is being accomplished through the construction of a series of very expensive arterial highways which will finally serve to drive new ways of entry into the city. The old lanes are not always widened in the country, but where they are not, the plan is to build parallel roads whereever rights of way can be obtained.

Strike Draining Coffers

"Then English engineers are thoroughly alive to their country's needs, and the one thing which is hampering them now is that general conditions resulting from the strike are so bad as to curtail temporarily the funds available for road improvement.

"With respect to city traffic control, we were interested to see that rotary or as they call it 'gyratory' traffic control is now being introduced at the 'circus' points or intersections having five or more streets entering them. The results have been decidedly satisfactory, although there was much 'grousing,' so we were told, when the system was introduced, on the ground that it was something which hasn't been done before.

Local Traffic Option in London

"One phase of London traffic which impressed us was that in the use of signals, which is just now being tested out, instead of a completely automatic control, there is a secondary system of buttons. If the policeman at any corner finds an exceptionally large stream of traffic damming up against the flow, he signals the central control, who may then give him the option of turning the tide for a brief time. The effect is decidedly advantageous and avoids the evil we frequently see in the United States, of vehicles held stationary at crossings when there is no traffic moving against them. As the pedestrian is left to take care of himself, the result is that the traffic is kept moving, while the pedestrian moves with more care and actually with more safety than in our cities."

Berlin Has Model City Plan

Asked about traffic development in other cities, Mr. MacDonald said that perhaps one of the most complete systems of development to be found anywhere, is that at Berlin, where the authorities are working out a coordinated system of all forms of transportation with a view to meeting large traffic needs within a few years.

"Not only does this plan provide for subways, trams and city streets, but a prudent proposal for a complete series of by-passes has been worked out which will deflect the heavy tourist and commercial traffic which is now pouring through the German capital in all directions.

"Paris has not yet felt the full impact of modern traffic, largely because of the exceptional width of the main boulevards of the city. Traffic signals are being tested out, however, and we were told that the authorities are working out plans for more complete control."

Rail and Highways Coordinated in Great Britain

Commenting upon general conditions, Mr. MacDonald said that one of the most interesting phases of the trip was the interrelation which the delegation

(Turn to page 18)

EUROPE TO BEAT U. S. IN ROAD BUILDING

(Continued from page 16)

found existing between rail and highway use in Great Britain.

"While this has not yet gone forward to the point of complete co-ordination, actually it has progressed much further than in the United States, since the English railways all use the motor truck in a very efficient collection and delivery service.

"Thus far there has been no attempt made by the rails aside from a bill introduced and defeated some years ago, to secure the right to a general use of the highways. In consequence, there is a good deal of bickering going on in the English press over the subject at the moment, but there also seems to be a general realization of the necessity for working out the joint problem in cooperation."

Another practice which he found of moment was that of the severe taxation to which some of the countries submit owners of motor vehicles.

Lower Taxes Necessary

"In some cases, the tax alone would be enough to buy a low priced car in this country. Obviously, such levies as these tend not only to narrow the range of purchasers but also to diminish the government revenue. This fact was pointed out by our delegation in our sessions with the several government officials and the American practice of holding the tax low and depending upon volume for returns cited. The fact that while our annual expenditures for rural roads are now around $1,000,000,000, we are able to collect $700,000,000 from the motorists and still keep the levy per car at a very low figure impressed our auditors, I think, with the soundness of our views."

During their stay abroad, the delegation, which marked the first official participation by the United States in the International Road Congress, took part in the sessions of that body at Milan and Rome and later traveled through Austria, Germany, Czecho-Slovakia, Sweden, Denmark, Holland, Brussels, France and England. At each point they surveyed many roads and held numerous conferences with leading government officials, including cabinet members, highway directors and others interested in highway development and in transportation generally.

Those in the delegation were: T. H. MacDonald, John N. Mackall, Chairman, Maryland Road Commission; Paul D. Sargent, Chief Engineer, Maine; H. H. Rice and Pyke Johnson, National Automobile Chamber of Commerce; H. H. Kelly and H. C. MacLean, Department of Commerce.—New Mexico Highway Journal.

War on "Hit-and-Run" Driver by Motor Clubs and Motorist Generally Urged by A. A. A.

ON its own behalf and on behalf of the 842 clubs affiliated with it throughout the country, the American Automobile Association recently broadcast a strong appeal urging relentless warfare on the "hit-and-run" drivers everywhere.

The appeal, which went out under the name of Thos. P. Henry, President of the A.A.A., was based on reports which show that this particular brand of lawlessness and cowardice has not received in the past the attention which it deserved. Hence the need of an organized campaign by the motorists generally to do away with this species of driver.

Mr. Henry's statement pointed out that the fact that in some cases it is difficult to get at the hit-and-run driver is all the more reason why he should be dealt with in exemplary fashion once the law gets hold of him.

"There are two ways," said President Henry, "in which members of the A.A.A., motorists generally and other agencies can give invaluable assistance in removing this blot on motordom, perhaps its worst.

"The first, succinctly, is to actually apprehend the hit-and-run driver or at least to give chase so that his license number can be made available immediately to the police. It often happens that motorists who have an opportunity to perform this public service are more interested in seeing what has happened to the victim of the accident than they are in capturing the person responsible for it.

"Club members and others, I am sure, will be more than willing to do their share in this respect. Such a movement already has been started by many clubs affiliated with the American Automobile Association.

"The second way is more complex and seems to require more than the co-operation merely of motorists. It is the reduction of this hysterical practice by educating all drivers to utter, hopeless stupidity of it. Motor clubs and all other agencies should take part in such an educational campaign.

"The hit-and-run driver, from a psychologic perspective, in many cases is a pathetic figure. He is the victim of the worst of all human emotions—fear. His action undoubtedly makes him criminal where his ordinary impulse might be toward the very best in our civilization.

"He is the victim of a human temptation, one that besets all of us—to flee from trouble. Fortunately, most of us are capable of resisting the temptation.

"A concerted campaign, I believe, could do much to show the hopeless futility of running away after an accident. Guilty or not guilty of carelessness, negligence or infraction of the traffic laws, the minute the driver who figures in an accident flees, the burden of proof of his innocence rests with him and he puts himself in the worst possible position before the law. There is a tremendous assumption of guilt that cannot be allayed.

"Innocent, in a great many cases, drivers go on daily convicting themselves by not having the courage to face the difficulty into which they have been thrown. It is time such emotionally unstable persons were taught the folly of their actions.

"Motor clubs can take the lead in this vital educational movement. It is one in which other agencies will co-operate heartily. Primarily it seems the task of organized automobile ownership for the practice is one that is leaving an indelible scar on the face of motordom.

"I am confident that remarkable results will be achieved once the A. A. A. local clubs set their shoulders to the wheel."

AUTOMOBILEITIS

There are so many automobiles in the United States that everybody in the country could get in and take a ride, if there wasn't something the matter with the ignition or something. On the average every family in the United States owns an automobile. At least the wife and kids do; Dad is not sure whether he owns an automobile or not. The automobile has brought about a lot of new problems, most of them in arithmetic. Automobiles are bought on faith, paid for on time and parked on other people's driveways. A few years ago you hardly met a car; now you can hardly meet the payments.

You can buy a fliver now for five dollars a week, and get a chattel mortgage that will outlast four sets of tires. Some people like Henry Ford and some don't, but there is no denying we owe a lot to Henry Ford. Mr. Ford has taken us out into the wide open spaces, which is a good deal better for us than hanging around in a wide open town.

There are really only two great questions before the American people today; how to pay and where to park. It is almost impossible for anybody to land in the gutter any more, not because of prohibition, but because some other fellow has already landed there. What this country needs isn't more freedom, but more free parking space.

The men who laid out our towns certainly didn't provide for the automobile. They should have made four curbs on every street; and why all the houses? Nobody stays home any more, or any more than we can help. Home is just a place to go to get money for gas. Home is just a place to go to start from.

If all the automobiles in the United States were put end to end—and on Sunday they are. A line of automobiles is as hard to pass as good legislation. About the only road that isn't jammed on Sunday is the road to church. There is plenty of room to park in the pews, but nobody ever thinks of that.

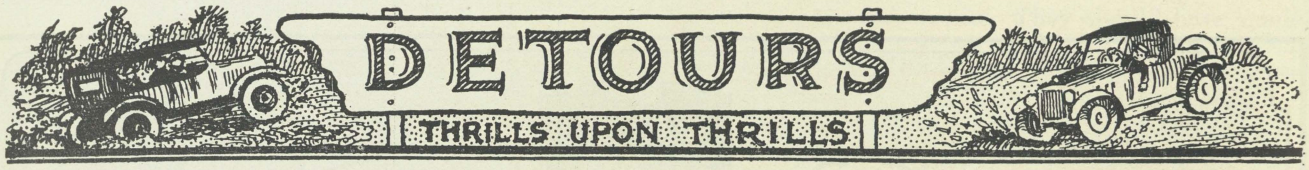
But everybody ought to own an automobile, or at least have one. Or else hire a taxi. We spend more for taxis now than our fathers did for taxes, and nobody complains that the taxes aren't high enough. But it is hard to see how our forefathers got around; perhaps that is the reason they got across.—Santa Fe New Mexican.

The Danger Line

Out where the buttons seem
A little tighter,
Out where the buckle shines
A little brighter:
Out where the girth becomes
A little longer;
Out where the straining seems
A little stronger—
That's where the Vest begins!

Contracts Awarded by State Road Department January 1st, 1927, to March 15th, 1927

Contractor	Project No.	County	Length Miles	Length Feet	Contract Plus 10%	Type
Noonan-Lawrence	54	Leon	13.00	....	$ 385,297.67	Concrete
Higginson Const. Co.	59	Leon-Jefferson	9.10	....	266,053.37	Concrete
Duval Engr. & Contr. Co.	54-A & 58	Leon-Jefferson	12.53	....	264,524.48	R. B. S. T.
Manley Constr. Co.	53-A	Lake	7.10	....	249,034.28	Asph. Conc.
W. J. Bryson Paving Co.	52	Escambia	10.089	....	241,904.49	C. G. & G.
Boone & Wester	677-C	Levy	10.16	....	224,345.88	C. G. & G.
Thompson & Moseley, Inc.	677-D	Levy	7.58	....	66,017.34	C. G. & G.
Lake Worth Const. Co.	683-C	Palm Beach	8.27	....	44,290.95	C. G. & G.
B. Booth & Co.	687-B	Lake	15.22	....	89,496.93	C. G. & G.
C. T. Dawkins	50-A	Putnam	....	120	22,243.32	Conc. Overhead
Okeechobee Const. Co.	655-667	Highlands	....	815	50,006.45	Timber
C H. Turner Co.	697	Escambia	....	488	22,911.53	Timber
Duval Engr. & Contr. Co.	571	Madison	14.26	....	47,190.03	S. T.
Langston Const. Co.	660	Clay	10.52	....	33,538.07	S. T.
H. E. Wolfe	48	St. Johns	15.39	.....	371,253.82	R. B.
Nelson Brothers	694	Martin	8.48	....	275,185.30	Concrete
Johnson, Drake & Piper.	693	St. Lucie	8.93	....	312,662.92	Concrete
Concrete Steel Bridge Co.	665	Clay	....	1400	208,167.96	Concrete
Concrete Steel Bridge Co.	664	Clay	....	1600	236,366.90	Concrete
Royce Kershaw, Inc.	640-B	Martin	....	131	32,201.40	Concrete
F. M. Stuart & Co.	40-B	Brevard	....	108	40,149.91	Concrete
Langston Const. Co.	641	Palm Beach	9.67	....	188,279.21	R. B.
Samuel Vadner	695	Lake	10.50	....	63,734.69	C. G. & G.
Tampa Sand & Shell Co.	695	Lake	....	....	63,368.28	Hyd. Fill
R. C. Huffman Const. Co.	669-D	Dade	12.30	....	382,038.36	C. G. & G.
Deen, Yarborough & Ebersbach	685	Franklin	17.43	....	159,980.86	C. G. & G.
Wm. P. McDonald Const. Co.	648	Hardee	7.14	....	24,075.97	S. T.
L. M. Gray	676-A—B	Levy	24.35	....	80.637.57	S. T.
John J. Quinn, Inc.	641	Palm Beach	1.00	....	52,494.31	S. T.
Brd. Co. Comr's Taylor Co.	746	Taylor	14.00	....	12,320.00	C. & G.
Finlayson & Morris	747	Jefferson	6.50	....	40,566.79	C. G. & G.
Totals			253.51	4,662	$4,550,339.04	



The Same

There was a naughty Boy,
And a naughty Boy was he,
He ran away to Scotland
The people for to see—
Then he found
That the ground
Was as hard,
That a yard
Was as long,
That a song
Was as merry,
That a cherry
Was as red—
That lead
Was as weighty,
That fourscore
Was as eighty,
That a door
Was as wooden
As in England—
So he stood in his shoes
And he wonder'd,
He wonder'd,
He stood in his shoes
And he wonder'd.
—John Keats's Poems.

So frequently employees leave one job for another, thinking there is less work, more pay and greater opportunity, to find that it is the same, and they wonder.—Exchange.

"So Much" Rope

Willie—"Pa sent me for a piece of rope like this,"
Hardware Dealer—"How much does he want?"
Willie—"Just enough to reach from the goat to the fence."—Exchange.

Reginald, nineteen years old, had, against the wishes of his noble parents, married a young woman of the chorus. Just after the ceremony, in telling a friend how to break the news to his father and mother, he said:

"Tell them first I am dead; then gently work up to the climax."—Hi-Jinks.

Frenzied Finance—Ponzi Out-Ponzied

A contributor to the Chicago Tribune is puzzled over the following. Having deposited $50 in a bank he withdrew:

First	$20, leaving a balance of	$30
Second	15, leaving a balance of	15
Third	9, leaving a balance of	6
Fourth	6, leaving a balance of	0
	$50	$51

He wants that extra dollar, which he says is still there to his credit, explained. We shall not attempt it; but with a financial acumen amazing even to ourself we have cogitated a plan to more than double our money every year. The plan is as follows: First, and this is easy, we persuade fifty bankers to keep their books in the above way. Second, on the first Monday of the year we deposit with one of said bankers $5,000, which we draw out during the week in the same ratio as above, leaving $100 to our credit on his books. We then deposit the $5,000 in bank number two and follow the same process as before, and so we go on during the entire year, ending up with our $5,000 in hand a trail of fifty-two banks owing us $100 each. Total, $10,200.

P. S.—The extra $200, by the way, might be spent in advance, feeding dope to the fifty bankers in order to get them to keep our account on their books in this peculiar way. If we could manage it with bootleg whisky, so much the better.—Boston Transcript.

Schoolboy Screams

"Joan of Arc was cannonized by Bernard Shaw."
"Lipton is the capital of Ceylon."
"Theseus begged Minos to try and kill the labyrinth."
"William III, on his way to Hampton Court, stumbled over a mole and broke his collar-stud—which was fatal to a man of his constituency."
"Sir Walter Scott wrote 'Quentin Durwood,' 'Ivanhoe,' and 'Emulsion.'"
"A talisman is a man who calls every week for the furniture money."
"Michael Angelo painted the selling of the cistern chapel."
"A prospectus is a man who finds gold."
"Fallacy is another name for suicide."
"A pollygon is a dead parrot."
"Sodium nitrate is the chief chilly sauce of nitric acid."
"*Cornigeri boves*—Corned beef."
"*Festina lente.*—The festival of Lent."
—*Quoted by the Living Church from the University Correspondent.*

Apropos of Brass Tacks

Prominent Banker (concluding his little chat with the ship-news reporters)—"And as for the foreign-debt situation, I believe that Secretary Mellon has handled the matter in a masterly fashion. If you don't agree with me, I should be glad to answer any questions you may have in mind."

Tabloid Reporter—"Is it true that your wife is contemplating divorce?"—Life.

In Other Words

A schoolgirl paraphrased the line "To bicker down the valley," from Tennyson's poem, "The Brook," as follows: "To have an undignified quarrel in a low place among the hills."

Another girl, given the line from "Lochinvar," "He stayed not for brake," paraphrased it: "He never stopt for a mechanical contrivance to reduce speed by means of friction."—Boston Transcript.

It may be true, as the scientists say, that stretching is an aid to health, but it doesn't seem to help truth any.—Seattle Times.

NOTE: The table, "Status of Road Construction," which customarily appears on this page, is eliminated this month because the Office Engineer did not, at the time of going to press, have all the reports necessary to compile the same. It will appear as usual in our next issue.

Florida Facts

The population of Florida has increased on an average of 4⅞% annually, while the whole United States increased only 2 4/5% annually.

Florida is the second state in size east of the Mississippi, containing 58,666 square miles.

Florida's population has increased 30% in the last five years, while the whole United States only 7%.

Florida has 35,000,000 acres of land.

Florida has 2,600 manufacturing and industrial establishments.

Florida has over 6,000 miles of railroads.

Florida has the largest acreage of citrus fruits, bearing and non-bearing, of any state.

Florida's average rainfall is about five feet. The greatest rainfall comes in the summer when it is most needed.

Florida has 2,635 common schools, 272 high schools, four state schools of higher education, 16 denominational schools and two industrial schools.

Florida is expending more for its schools and churches in new construction than any part of the Union.

Possibility of litigation in settling estates greatly reduced. Valuable and sentimental papers can be placed in a safety deposit box in a Florida institution and not be subject to espionage by state officials.

During the decade 1915 to 1925 the wealth of Florida increased greater than any other state in the Union.

The Everglades contains 3,000,000 acres of land as rich as the delta of the Nile and can support one million people alone.

There are 250 different varieties of crops, fruits, nuts and vegetables grown in Florida and shipments out of the state average one car every six minutes, day and night, the year 'round.

Florida is second to none in variety of agricultural product and fertility of soil.

Agricultural lands available at $40 an acre will produce on twenty acres more net wealth than one hundred and sixty acres almost anywhere else.

Is sixth in the Union in manufacture of tobacco products, and manufactures 500,000,000 cigars annually.

Is tenth in the Union in lumber produced.

Is second in the Union in cypress lumber produced.

Is seventh in the Union in yellow pine produced.

Is first in the Union in turpentine and rosin produced.

Is first in the Union in grapefruit produced.

Is second in the Union in oranges produced.

Is second in the Union in watermelons produced.

Is first in the Union in celery produced.

Is first in the Union in early cucumbers produced.

Is first in the Union in fresh tomatoes produced.

Is third in the Union in early lettuce produced.

Produces tangerines, pineapples, strawberries, sugar and bananas.

Sells more than $20,000,000 worth of fish and other sea foods annually.

Florida's 1925 population was 1,263,549.

103,778 carloads of fruits and vegetables were shipped from Florida in 1925.

Florida had, 1920, 3,336 hotels, and today over 16,000.

Florida has today over 13,000 filling stations against 2,000 in 1920.

Florida has a larger area of forest than most other States in the Union.

The northern boundary of Florida is farther south than the southern boundary of California.

Florida has an abundance of excellent water, and many of her springs are nationally known for their curative properties.

Salt-water scale fish shipments last year were 116,915,000 pounds. 190,000 barrels of oysters and clams and 19,552,000 pounds of shrimp were canned.

Florida has 231 civic bodies.

Florida has 121 golf courses.

The assessed valuation of real and personal property in Florida, in 1926, was $166,000,000 more than 1925, and 377 millions more than 1920.

Cash in the state treasury at the close of its fiscal year, June 30, 1926, was $17,655,317.22, and no state debt.

Over 500 different kinds of fish have been caught in the waters surrounding Florida.

Adding lake and river fronts to the 1,273 miles of seacoast, Florida has 9,500 miles of beautiful water front, enough to accommodate 1,000,000 homes and house 5,000,000 people dwelling comfortably on the margin of our waters.—Florida Power & Light Company Magazine.

Missed the Hearse

Three thousand men and women marched this afternoon through streets where once Ben Franklin trod to his grave in the Old Christ Church burial-grounds.—Philadelphia Evening Public Ledger.

After the Check-Up

ENOUGH time has now elapsed to gain widespread reports on any damage which might have been suffered by Florida roads and streets during the past six months.

Careful check-up is more dependable than hasty conclusion.

So far as investigation can reach, EVERY HIGHWAY AND STREET WITH LIME-ROCK BASE EASILY WITHSTOOD RAINS AND HIGH WATERS!

Another primary reason for Lime-Rock—the all-Florida product—it stands up under punishment!

Simply give Lime-Rock the proper drainage and a surface which an experienced engineer would approve, and for many years it will absorb the shocks of traffic and the attacks of weather, with upkeep costs amounting to little or nothing.

If your street does not happen to have a Lime-Rock base, you will learn many interesting points in economy by talking to the man who is enjoying Lime-Rock permanency!

Lime Rock has the endorsement of leading testing laboratories as a material of exceptional permanence.

Lime Rock Is the Life of the Highway

A FLORIDA PRODUCT

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Lime Rock has the approval of the Federal Bureau of Highways, as base material for Government Roads

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